

What is claimed is:

1. A system for humidifying a gas, said system comprising:
 - a housing defining a humidification chamber through which a gas travels;
 - a humidification assembly adjacent to said housing, said humidification assembly comprising:
 - a source of humidifying liquid; and
 - a porous wick for carrying the humidifying liquid from the source of the humidifying liquid into the humidification chamber;
 - said wick separating the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the gas traveling through the humidification chamber.
2. A system for humidifying a reactant gas for use in a fuel cell, said system comprising:
 - a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;
 - a humidification assembly adjacent to said housing, said humidification assembly comprising:
 - a source of humidifying liquid; and
 - a porous wick for carrying the humidifying liquid from the source of the humidifying liquid into the humidification chamber;

said wick separating the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the reactant gas traveling through the humidification chamber.

3. A system according to claim 1 or 2, wherein said porous wick comprises a material selected from the group consisting of metals and ceramics.

4. A system according to claim 3, wherein said porous wick comprises a ceramic formed from a mixture of water, nitric acid, hollow polymer spheres, and at least one substance selected from the group consisting of a zirconium compound, aluminum oxide, and silicon oxide.

5. A system according to claim 3, wherein said porous wick is composed of a metal formed from a mixture comprising metal powder, a binding agent, water, and hollow polymer spheres.

6. A system according to claim 5, wherein said metal powder comprises at least one substance selected from the group consisting of iron, chromium, bronze, brass, copper, and nickel.

7. A system according to claim 1 or 2, wherein said porous wick comprises approximately 50% to approximately 95% void volume.

8. A system according to claim 1 or 2, wherein said porous wick defines a plurality of interconnected voids.

9. A system according to claim 8, wherein the diameter of each of said voids is between approximately 10 microns and approximately 50 microns.

10. A system according to claim 8, wherein substantially each void intersects with at least one adjacent void to form a substantially circular window at each intersection.

11. A system for humidifying a proton exchange membrane in a fuel cell, said system comprising:

a fuel cell having a proton exchange membrane; and

a porous wick for humidifying the proton exchange membrane of the fuel cell, said wick comprising a ceramic formed from a mixture comprising water, nitric acid, hollow polymer spheres, and at least one substance selected from the group consisting of a zirconium compound, aluminum oxide, and silicon oxide.

12. A system for humidifying a proton exchange membrane in a fuel cell, said system comprising:

a fuel cell having a proton exchange membrane; and

a porous wick for humidifying the proton exchange membrane of the fuel cell, said wick comprising a metal formed from a mixture comprising metal powder, a binding agent, water, and hollow polymer spheres.

13. A system according to claim 12, wherein said metal powder comprises at least one substance selected from the group consisting of iron, chromium, bronze, brass, copper, and nickel.

14. A system according to claim 11, 12, or 13, wherein said wick comprises approximately 50% to approximately 95% void volume.

15. A system according to claim 11, 12, or 13, wherein said porous wick defines a plurality of interconnected voids.

16. A system according to claim 15, wherein the diameter of each of said voids is between approximately 10 microns and approximately 50 microns.

17. A system according to claim 15, wherein substantially each void intersects with at least one adjacent void to form a substantially circular window at each intersection.

18. A method for humidifying gases, said method comprising the steps of:
providing a housing defining a humidification chamber through which a gas travels;

further providing a humidification assembly adjacent to said housing, said humidification assembly comprising a porous wick and a source of humidifying liquid, wherein said porous wick separates the source of humidifying liquid from the

humidification chamber such that the humidifying liquid flows through the wick before humidifying the gas traveling through the humidification chamber;

communicating the humidifying liquid into the wick;

receiving the gas in the humidification chamber;

humidifying the gas with humidifying liquid as the gas flows across the wick in the humidification chamber.

19. A method for humidifying reactant gases for use in a fuel cell, said method comprising the steps of:

providing a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;

further providing a humidification assembly adjacent to said housing, said humidification assembly comprising a porous wick and a source of humidifying liquid, wherein said porous wick separates the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the reactant gas traveling through the humidification chamber;

communicating the humidifying liquid into the wick;

receiving the reactant gas in the humidification chamber;

humidifying the reactant gas with humidifying liquid as the reactant gas flows across the wick in the humidification chamber.

20. A method according to claim 18 or 19, wherein said porous wick comprises a material selected from the group consisting of metals and ceramics.

21. A method according to claim 20, wherein said porous wick comprises a ceramic formed from a mixture comprising water, nitric acid, hollow polymer spheres, and at least one substance selected from the group consisting of a zirconium compound, aluminum oxide, and silicon oxide.

22. A method according to claim 20, wherein said porous wick is comprises a metal formed from a mixture comprising metal powder, a binding agent, water, and hollow polymer spheres.

23. A method according to claim 22, wherein said metal powder comprises at least one substance selected from the group consisting of iron, chromium, bronze, brass, copper, and nickel.

24. A method according to claim 18 or 19, wherein said porous wick comprises approximately 50% to approximately 95% void volume.

25. A method according to claim 18 or 19, wherein said porous wick defines a plurality of interconnected voids.

26. A method according to claim 25, wherein the diameter of each of said voids is between approximately 10 microns and approximately 50 microns.

27. A method according to claim 25, wherein substantially each void intersects with at least one adjacent void to form a substantially circular window at each intersection.

28. A system for humidifying a reactant gas for use in a fuel cell, said system comprising:

a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;

a humidification assembly adjacent to said housing, said humidification assembly comprising:

means for supplying humidifying liquid; and

means for wicking the humidifying liquid from said supplying means into the humidification chamber;

said wicking means separating the supplying means from the humidification chamber such that the humidifying liquid flows through the wicking means before humidifying the reactant gas traveling through the humidification chamber.